

WHAT IS CLAIMED IS:

- 1 1. A method for smoothing, comprising:
2 loading, in a data processing system, a model having
3 at least one node;
4 receiving a selection of a node of the model;
5 determining a nodal valency of the node;
6 determining an element connectivity pattern of the
7 node;
8 performing a smoothing operation on the node according
9 to the nodal valency and the element connectivity
10 pattern; and
11 storing the model.

- 1 2. The method of claim 1, wherein
2 if the element connectivity pattern is a triangle,
3 then incenter-based smoothing is performed;
4 if the element connectivity pattern is a quad-only
5 mesh, then isoparametric-Laplace smoothing is
6 performed;
7 if the element connectivity pattern is a mapped
8 region, then equipotential smoothing is
9 performed; and
10 if the element connectivity pattern is a free-mixed
11 mesh, then combined incenter and laplacian
12 smoothing is performed.

1 3. The method of claim 1, wherein the smoothing of the
2 node is performed using

$$\begin{array}{c} 3 \qquad N \\ 4 \qquad P_i' = \sum_{n=1}^N F_n(C,V) * \Omega_n(C,V) \\ 5 \qquad \qquad n = 1 \end{array}$$

6 and wherein i is the node to be smoothed, i is
7 connected to N elements, P_i' is the new position of
8 node i , F_n is the variational weight factor for n -th
9 element Ω_n is the positional function for n -th
10 element, C denotes the connectivity pattern of the
11 node, and V indicates the valency of the node.

1 4. The method of claim 1, further comprising performing
2 an interior angle screening process.

1 5. The method of claim 1, further comprising constraining
2 the node within a predetermined tolerance.

1 6. A data processing system having at least a processor
2 an accessible memory, comprising:
3 means for loading a model having at least one node;
4 means for receiving a selection of a node of the
5 graphic model;
6 means for determining a nodal valency of the node;
7 means for determining an element connectivity pattern
8 of the node;
9 means for performing a smoothing operation on the node
10 according to the nodal valency and the element
11 connectivity pattern; and
12 means for storing the model.

1 7. The data processing system of claim 6, wherein
2 if the element connectivity pattern is a triangle,
3 then incenter-based smoothing is performed;
4 if the element connectivity pattern is a quad-only
5 mesh, then isoparametric-Laplace smoothing is
6 performed;
7 if the element connectivity pattern is a mapped
8 region, then equipotential smoothing is
9 performed; and
10 if the element connectivity pattern is a free-mixed
11 mesh, then combined incenter and laplacian
12 smoothing is performed.

1 8. The data processing system of claim 6, wherein the
2 smoothing of the node is performed using

$$\begin{array}{c} 3 \\ 4 \end{array} \quad \begin{array}{c} N \\ P_i' = \sum_{n=1}^N F_n(C,V) * \Omega_n(C,V) \end{array}$$

5 $n = 1$

6 and wherein i is the node to be smoothed, i is
7 connected to N elements, P_i' is the new position of
8 node i , F_n is the variational weight factor for n -th
9 element Ω_n is the positional function for n -th
10 element, C denotes the connectivity pattern of the
11 node, and V indicates the valency of the node.

1 9. The data processing system of claim 6, further
2 comprising means for performing an interior angle
3 screening process.

1 10. The data processing system of claim 6, further
2 comprising means for constraining the node within a
3 predetermined tolerance.

1 11. A computer program product tangibly embodied in a
2 machine-readable medium, comprising:
3 instructions for loading, in a data processing system,
4 a model having at least one node;
5 instructions for receiving a selection of a node of
6 the graphic model;
7 instructions for determining a nodal valency of the
8 node;
9 instructions for determining an element connectivity
10 pattern of the node;
11 instructions for performing a smoothing operation on
12 the node according to the nodal valency and the
13 element connectivity pattern; and
14 instructions for storing the model.

1 12. The computer program product of claim 11, wherein
2 if the element connectivity pattern is a triangle,
3 then incenter-based smoothing is performed;
4 if the element connectivity pattern is a quad-only
5 mesh, then isoparametric-Laplace smoothing is
6 performed;
7 if the element connectivity pattern is a mapped
8 region, then equipotential smoothing is
9 performed; and
10 if the element connectivity pattern is a free-mixed
11 mesh, then combined incenter and laplacian
12 smoothing is performed.

13. The computer program product of claim 11, wherein the smoothing of the node is performed according using

$$P_i' = \sum_{n=1}^N F_n(C,V) * \Omega_n(C,V)$$

and wherein i is the node to be smoothed, i is connected to N elements, P_i' is the new position of node i , F_n is the variational weight factor for n -th element Ω_n is the positional function for n -th element, C denotes the connectivity pattern of the node, and V indicates the valency of the node.

14. The computer program product of claim 11, further comprising instructions for performing an interior angle screening process.

15. The computer program product of claim 11, further comprising instructions for constraining the node within a predetermined tolerance.